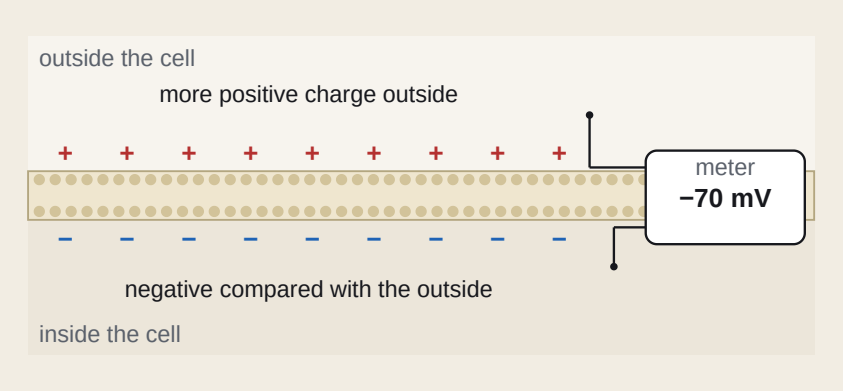
A2 · The resting neuron · Completed notes

Goals: Say what a polarized membrane is, and state the resting potential. Say where sodium ions and potassium ions are in a resting neuron. Explain why the inside of a resting neuron is negative. Describe what the sodium-potassium pump does.

These are the completed notes. The blanks are filled in and each question is worked.

Slide 1 of 4 · A charge across the membrane

In lesson A1, a nerve impulse travelled along the axon of a neuron. Today you look at the axon before a nerve impulse arrives.



Key ideas

A membrane with a different charge on each side is **polarized**.

The difference in charge is the **membrane potential**. It is measured in **millivolts**.

In a resting neuron it is −70 mV. This is the **resting potential**.

Example

State the resting potential of a neuron. Say which side of the membrane is negative.

1. The resting potential is −70 mV.
2. The inside is negative compared with the outside.

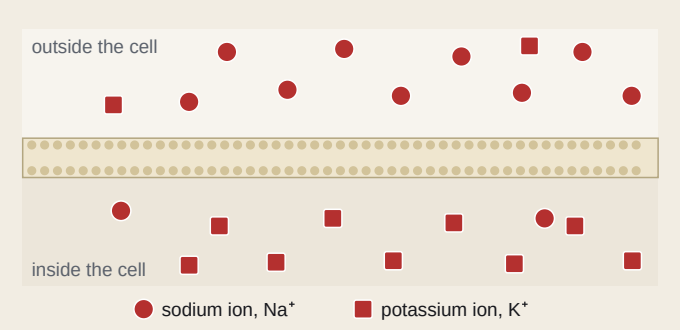
Try it

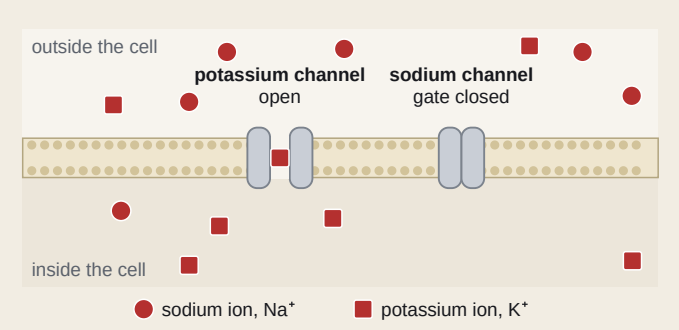
Explain what "polarized" means for the membrane of a neuron.

1. The two sides of the membrane have a different charge.
2. The outside has more positive charge than the inside.

Slide 2 of 4 · Where the ions are

On the last slide, the inside of a resting neuron was negative. To see why, you first need to know where the ions are.





Key ideas

Outside the cell there are many **sodium** ions.

Inside the cell there are many **potassium** ions.

Ions cross the membrane only through **ion channels**.

Ions move through an open channel by **diffusion**, from more to less.

Example

A potassium channel opens. Predict which way potassium ions move, and say why.

1. There are more potassium ions inside the cell.
2. Diffusion goes from more to less.
3. So potassium ions move out of the cell.

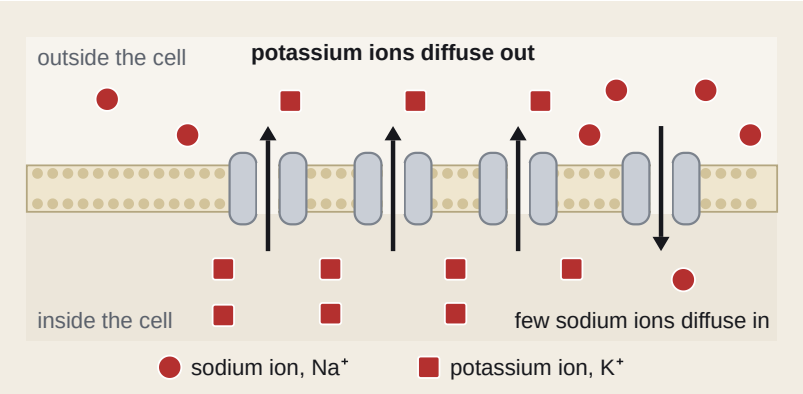
Try it

A sodium channel opens. Predict which way sodium ions move, and say why.

1. There are more sodium ions outside the cell.
2. Diffusion goes from more to less.
3. So sodium ions move into the cell.

Slide 3 of 4 · Why the inside is negative

On the last slide, sodium ions were mostly outside and potassium ions mostly inside. Both ions are positive. So why is the inside negative?



Key ideas

A resting neuron has many more **potassium channels** than sodium channels.

So more potassium ions diffuse **out** than sodium ions diffuse in.

Negative ions cannot cross the membrane. They **stay** inside.

So the inside is **negative** compared with the outside.

Example

Explain why the inside of a resting neuron is negative.

1. Potassium ions diffuse out and carry positive charge with them.
2. Negative ions cannot leave.
3. So the inside is left negative.

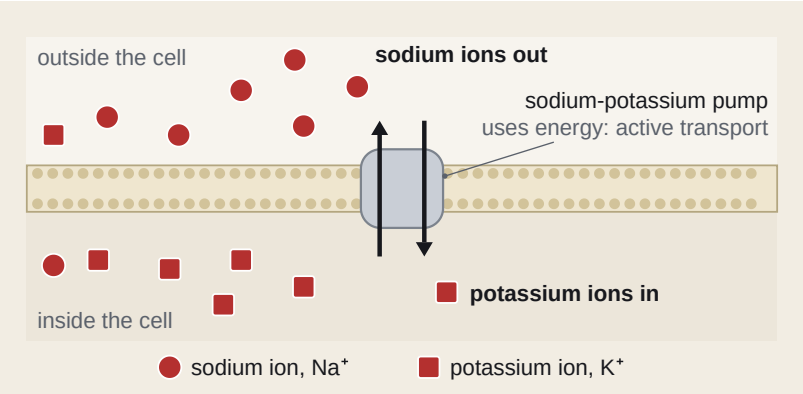
Try it

State which ion leaves a resting neuron in the larger amount. Name what it carries out.

1. Potassium ions leave in the larger amount.
2. Each one carries a positive charge out of the cell.

Slide 4 of 4 · The sodium-potassium pump

On the last slide, potassium ions leaked out of the cell. A few sodium ions leaked in. If that went on, the two sides would become the same.



Key ideas

The **sodium-potassium pump** moves sodium ions out and potassium ions in.

It moves each ion to the side that already has **more**.

This uses **energy**. It is **active transport**.

Example

Sort into diffusion or active transport: potassium ions leave through a channel.

1. The ions move from more to less.
2. No energy is used.
3. It is diffusion.

Try it

Sort into diffusion or active transport: the pump moves sodium ions out of the cell.

1. There are already more sodium ions outside.
2. Moving from less to more uses energy.
3. It is active transport.